

PLATE XXXV.

Figs. 1-1 a.	<i>Ennea nyiroensis</i> , sp. n.
2-2 a.	" <i>optata</i> Preston, var. <i>majuscula</i> , var. n.
3-3 a.	" " " " <i>obesa</i> , var. n.
4-4 a.	" <i>papyracea</i> , sp. n.
5-5 a.	" <i>percivali</i> , sp. n.
6-6 a.	" <i>pergrata</i> , sp. n.
7-7 a.	" <i>perturbata</i> , sp. n.
8-8 a.	" <i>pervitrea</i> , sp. n.
9-9 a.	" <i>pollonerae</i> , sp. n.
10.	" <i>rectangularis</i> , sp. n.
11.	" <i>reniformis</i> , sp. n.
12-12 a.	" <i>spatium</i> , sp. n.
13.	" <i>suavissima</i> , sp. n.
14-14 a.	" <i>viatoris</i> , sp. n.
15-15 a.	" <i>woodhousei</i> , sp. n.

16. Notes on the Habits of Certain Reptiles in the Lagos District. By W. A. LAMBORN, M.R.C.S.*

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I. *On the Habits of the Lizard Agama colonorum, Daudin, and on Native Superstition in regard to the Chameleon.*

For some two years I have devoted spare time in Nigeria to the pursuit of Entomology, and one of the questions in which I have interested myself has been as to the palatability of Lepidoptera.

To test this various animals have been employed, and one which has been of great service to me is the common West African lizard *Agama colonorum*. This is by far the most abundant lizard in the district—a camp called Oni on the bank of a fresh-water lagoon 70 miles east of Lagos and 10 miles from the sea, and so I have had ample opportunities of making observations as to its habits.

I must express my grateful thanks to Mr. G. A. Boulenger, F.R.S., for advice and for his kind help in identifying the species of the lizards by means of the specimens in the Natural History Museum.

Agamas are found on high ground only, such as is always above flood-level, and in open spaces, and they group together in communities consisting of six or seven adult females headed by a male. I am strongly of opinion that these females look to one lord and master only, and that every such family is to be found day after day in one particular locality. This point might, of

* Communicated by Prof. E. B. POULTON, F.R.S., F.Z.S.

course, have been settled by marking the females, but the difficulty has been that they are particularly wary and hard to catch. I have satisfied myself, however, that any particular male can always be found within the limits of a small area day by day, and that the females keep within the same neighbourhood is indicated by both sexes habitually seeking the same resting place night after night.

During several months of the year 1912 a male lizard invariably slept under the eaves of my bungalow, gaining access thereto by climbing one particular pillar. On one occasion when it sought the usual resting place I drove it down, but it returned a few minutes later. I frightened it off twice again and even then it came back, and finally I allowed it to climb up.

An old female, which I knew well because it had a bulbous stump in the place of its tail, always entered a particular hole in the wall of the bungalow at night-time. The young lizards wander to a far greater extent, not attaching themselves to any particular group, and I do not think that they seek nightly any regular sleeping place.

The male lizard is a strict disciplinarian, and if one of his harem happens to offend him he chases her and endeavours to inflict a bite. The females have in consequence a due respect for him, so much so, that if some one drops a number of butterflies in the vicinity the females, as a rule, wait for the male to take his fill before attempting to satisfy their appetites, and if one of the females does presume to attempt to share the meal, the male becomes so filled with the desire to inflict vengeance that he will desert the prey and chase the offender with the utmost activity, often leaving the other females to test the meal.

The remarkable subservience of the females appears to be connected with the great disparity in the numbers of the sexes. The male's responsibilities seem to be in excess of his capacities, so that the females are forced to resort to various artifices to secure their share of his attentions. This solicitation usually takes the form of running up to the male, elevating the tail in front of him and turning it to one side, but even then he frequently responds by biting the importunate female. If she runs away, however, he will sometimes pursue, and unless she allows herself to be caught too readily, her end may be attained. I am sure that this little manœuvre does act as an incentive to the male.

Previous to the act of pairing, the male mounts the female from one side and supports himself by gripping the neck in his jaws, her tail being raised and deflected to the opposite side. When coupling has been initiated, the male releases the neck of the female and takes up a position more or less at a right angle to her while it is in progress. If disturbed, both of course endeavour to rush away, and the male will often drag the female for a distance of some feet, sometimes up a tree, before uncoupling results. The process usually lasts two or three minutes.

The eggs, in a cluster of three or four, are deposited in the

ground excavated by the female and are then covered with earth. The choice of a situation to the liking of the female seems to be a difficult one, for she will frequently make several burrows without ovipositing in any. These are left open, with the little heap of earth at one side.

As is to be expected, the males are exceedingly combative, and the entry of one into the preserves of another usually leads to a battle. The males eye one another from a distance, raising and lowering the forepart of the body repeatedly at a slow rate. One then approaches a few feet nearer to the other and rests again, watching its adversary, and then after a long wait rushes up from a distance of two or three feet to within a few inches of him. The tail is the offensive weapon, and to bring it into action the males take up a position parallel to each other but head to tail. Each seeks to overcome the other not by a number of strokes but by a single well-directed blow, and there is much manœuvring with a view to obtaining a favourable position. Many of the blows are ineffective, for the lizards dodge each other very skilfully, but when a blow does get home it may be a powerful one, judging by the resounding smack which follows. After a few such blows one turns tail and the victor pursues him, with the result that a further round may be fought out, though often the loser is simply chased away. The males never are killed in their combats, and I have never seen one male attempt to bite another.

There is more tendency for the females to bite each other, and one frequently sees a large female running open-mouthed at a smaller one, especially if the smaller one happens to have protruding from its mouth a morsel too large to be readily swallowed.

Both males and females will bite when cornered if an attempt be made to handle them.

The lizards are usually insectivorous, but when insects are scarce, as in the dry season, they will not uncommonly eat vegetable matter such as lettuce, tomatoes, and various indigenous fruits.

Their voracity is remarkable. On February 12th, 1912, I dropped no fewer than eighteen of the Pierine butterfly, *Phrisura sylvia*, before a male lizard, and all were consumed within ten minutes.

I have left behind me in Nigeria a snake 10 inches long which had been seized by a lizard of this species. I did not personally see the incident, but on returning to camp after a short absence on June 29th, I was shown the bodies of the snake and lizard, and was told by my colleagues that they had seen the lizard walking backwards dragging the snake by its upper jaw. Still proceeding backwards it began to climb a palm tree, the snake actively wriggling all the time, and it reached a height of six feet. Unfortunately, at this point some barbarian instinct prompted one of the men to throw a stone which injured the lizard so that the snake was released and fell to the ground, where it was despatched.

Incidentally I may say that it is easy to hit a lizard with a stone. They seem unable to judge its flight and make little attempt to dodge it.

If one endeavours to approach them they run off at a rapid rate towards the nearest wall or tree, as they are able to scale a rough perpendicular surface readily.

When on the look-out for prey they mount a stone or other point of vantage whence a more ready view of the neighbourhood can be obtained.

It is of course the common belief among the West Coast natives as it is among country people even in England, that the lizard is a venomous reptile. In connection with this point I have been asked to take this opportunity to communicate with my own facts an observation made by Mr. J. A. de Gaye, F.L.S., Science Master at King's School, Lagos, on native superstition in regard to chameleons. He thus describes an incident which he noticed in July 1912, at Ouitsha, a town about 200 miles from the mouth of the Niger:—

“ While walking in the long grass not far from the Mission I came across a couple of chameleons. The natives are very much afraid of that animal. It is true that when disturbed it opens its mouth wide as if to bite, but it is quite harmless. There is a curious superstition about chameleons in Nigeria. When I showed my chameleons to my boy, he rushed back shivering with terror and shouted, ‘ Massa, massa, this be plenty bad. If he go bite you, he bite you all time. When thunder he dey come, then he go fear, he go.’

“ I could not help laughing at the stupidity of the superstition, and did my best to explain how foolish it was to believe in such nonsense. It was of no avail, the only reply was, ‘ he be true, all dem people dey go tell you so.’”

Anyone familiar with the mind of the West African native will know that such incidents can be paralleled wherever the chameleon occurs. I remember how when I first went to the coast I brought a chameleon home from the bush, and happening to look into the kitchen to give an order as I was passing, I was astonished to see the cook depart *via* the window, as I came in by the door.

He was an Accra man, and as far as I could make out on questioning him, his dread of the beast was based less on its supposed poisonous powers than on its possession of powers associated with the evil eye. This belief in the occult powers of the chameleon is illustrated by another incident in my experience.

I had a chameleon in captivity, and a Benin boy who acted as my gardener came to beg it of me, giving as his reason that he wanted it for the purpose of making juju, but with what particular idea I was unable to ascertain.

II. *On the Habits of African Crocodiles.*

My second note relates to the eggs of a crocodile found at the camp already mentioned.

On about April 15th, 1912, my attention was drawn by a native to croaking noises, much like the sounds made by our English frogs at the breeding-season, emanating from below the path at a spot about 6 feet from my bungalow, which is about 50 feet above water-level and about 100 yards from the lagoon.

The native told me that crocodiles' eggs must have been deposited there, and that when the young ones are about to hatch out they invariably make these sounds so that the mother may learn that they are ready and come to dig up the eggs. There were no surface indications of any disturbance of the ground, and as the path had been made of laterite crushed and rolled hard to a cement-like consistence three years before, and as there had been a daily stream of passers by on it all this time, I was not inclined to believe his story. However, on digging with a cutlass we found 13 eggs at a depth of about 18 inches. The eggs were elliptical, measuring 67 mm. in length and 42.5 mm. in maximum diameter. The croaking sounds did come from these, for some of the young crocodiles croaked as I held the eggs in my hand, and when these ceased others seemed to begin croaking in turn. The sounds were to be heard at regular intervals of five seconds.

All the eggs, except a bad one, were starred by fracture at a particular spot, at the side towards one pole, though the shell was still held in shape by the unbroken subjacent membrane, and all the young crocodiles hatched within half an hour of being dug up.

In four cases the head only came out, and as the young seemed too feeble to complete the exodus we pulled them out, after waiting a reasonable time.

The young crocodiles attempted to run off in the long grass as soon as they hatched and showed active resentment at any molestation, viciously snapping at the hand if one touched them. They were placed in a bath, in shallow water changed daily, and for about two weeks after hatching they croaked at night, especially when rain was in the air, but after that they made no sounds unless one approached after dark with a light, when an occasional croak might be heard.

They remained healthy and active, though without food, for two months, and then a small fish was administered to each, and when I came away in July they were feeding of their own accord on small fish and large freshwater shrimps.

I have been informed by natives that the young crocodiles, immediately after hatching, attach themselves to the dorsal fringe on the tail of the mother and are thus conveyed by her to the

water, but I have not been able to obtain really reliable evidence on this point.

In connection with the whole subject I find a most interesting reference in Livingstone's account of his first expedition to Africa.

In December 1853 he encamped on the banks of the river Leeba, a tributary of the Zambesi, and his statement runs as follows:—

“We saw 60 eggs taken out of a single nest. They are about the same size as those of a goose, but perfectly round. The shell is partially elastic from having a strong internal membrane and but little lime in its composition.

“The spot was about 10 feet above the water, and the broad path leading down to the river-side furnished evidence of its having been used for a similar purpose in former years. The dam after depositing her eggs covers them up, and returns to assist the young out of their place of confinement. Assistance seems necessary, for besides the tough membrane of the shell, they have four inches of earth upon them.

“They do not, however, require immediate food, because they retain a portion of the yolk equal to that of a hen's egg in a membrane in the abdomen as a stock of nutriment. When this is expended, the dam leads them to the water's edge and lets them catch fish for themselves.”

It will be noticed that Dr. Livingstone described the eggs as being “perfectly round.” The eggs which I saw were distinctly elliptical, and the measurements recorded were taken with callipers. I have seen still larger crocodile eggs which were also elliptical. They were 80 mm. in length and 51 mm. in diameter, and were found in a shallow nest covered with dead leaves and other débris at the foot of a large tree near the water.

Prof. Poulton has kindly furnished me with a translation by Mr. E. A. Elliott, F.Z.S., of a paper read by Dr. A. Voeltzkow in 1899 before the Berlin Academy of Sciences, “On the development and habits of *Crocodilus madagascariensis* on the East Coast.”

The translation of the section dealing with points that I have mentioned runs as follows:—

“In the workroom (study) of my house I kept crocodile eggs in some boxes filled with sand, which I had always under observation, in order to observe the emergence of the young reptiles. One day I heard sounds issuing from one of these boxes, and supposed that possibly a young one had emerged and had emitted these sounds while being suffocated in the sand—which would not have surprised me, as I had long known that the young are capable of emitting sounds.

“On digging down the astonishing fact was revealed that the sounds proceeded from unbroken shells.

“The sounds were so loud that if the eggs were exposed they could be heard distinctly in the adjoining room. If, as in nature,

the eggs are covered by 1-2 metres of sand, the sounds are duller but still distinct at the length of a room. This crying of the young can be induced by walking heavily past the receptacle containing the eggs, by knocking against it, by taking an egg in the hand and turning it; in fact, any shock causes the young one to lift up its voice in the egg.

"As the female visits the nest almost daily in order to convince herself of its orderly condition, her passage from the water to the nest and back shakes the ground and induces the production of sound by those young ones which are sufficiently developed. Thereupon the old one scrapes the sand out of the pit and presently the young emerge. When eggs from my boxes were dug up and kept exposed immediately after the first sounds were heard, the young emerged in about three days.

"The fact that the young give out sounds was unknown to the natives, and no one believed me until convinced by actually listening to (the sound in) the egg. I demonstrated this striking discovery to the English Consul and to the French officials at Majunga.

"The sounds are produced with the mouth closed, apparently with strong contraction of the ventral muscles sometimes, as we produce hiccough sounds, and the tone is similar."

In this paper there is also a reference to an observation by Humboldt who, in the case of *Crocodilus acutus*, notes that when incubation is complete the female returns and calls the young, which answer her voice.

Dr. Voeltzkow states that there is nothing to show whether this statement was founded on Humboldt's own observations or was simply repeated from native observation.

There is a little doubt as to the identity of the species observed by me, but Mr. G. A. Boulenger, F.R.S., in a letter to Prof. Poulton, states that he regards the common Lagos crocodile as identical with *C. niloticus*. My species is the common crocodile of the Lagos district, the largest I have seen measuring 9 feet from snout to tip of tail, and I have no doubt that it is the western form of *niloticus*; but as the habits here described do not appear to have been recorded from the West Coast and as some of the facts may be new, I have felt it desirable to put my own account on record.